

**REMARKS**

**I. INTRODUCTION**

New Abstract has been provided herewith on a separate sheet to substitute the originally-filed Abstract. Claims 48, 62, 70, 84, 98, 100, 106 and 107 have been amended above to clarify the subject matter recited therein. Claims 58, 66, 76, 80, 94, 99 and 102 have been amended to remove minor informalities therefrom, and not for any reasons relating to patentability thereof. Claims 48-108 are now under consideration in the above-referenced application. Provided above, please find a claim listing indicating the current amendments to the previously-pending claims on separate sheets so as to comply with the requirements set forth in 37 C.F.R. § 1.121. It is respectfully submitted that no new matter has been added.

**II. OBJECTION TO THE ABSTRACT SHOULD BE WITHDRAWN**

In the latest Office Action, the Examiner objected to the Abstract as not being on a separate sheet. As the Examiner shall ascertain, the Abstract for the present application has been provided on a separate sheet herein above. Accordingly, the objection to the Abstract is now moot, and should therefore be withdrawn.

**III. REJECTION UNDER 35 U.S.C. § 112, ¶1 SHOULD BE WITHDRAWN**

Claims 48-97 and 101 stand rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the written description requirement. Applicants respectfully assert that the specification and drawings of the application provide more than

sufficient support to comply with the written description requirement with respect to claims 48-97 and 101, for at least the following reasons.

In particular, with respect to independent claims 48, 70 and 101, the Examiner believes that the originally-filed specification does not contain the disclosure for the phrase “along a particular direction, the intensity distribution is approximately constant for at least a predetermined distance,” a recited in these claims. (See latest Office Action, p. 3, first full paragraph). In addition, for independent claims 62 and 84, the Examiner believes that the specification does not provide the disclosure for the recitation of “along a particular direction, widths of at least two sections of the intensity distribution are approximately the same.” (*Id.*, p. 3, third full paragraph). Applicants respectfully disagree – indeed, the originally-filed drawings and specification provide a detailed disclosure and support for such claimed subject matter. The exemplary support is as follows:

- Originally-filed Figure 1.
- Originally-filed Figure 3.
- Originally-filed Figure 9.
- Originally-filed specification, page 5, line 2 - “axial line focus.”
- Originally-filed specification, page 5, line 10 - “line focus.”
- Originally-filed specification, page 5, line 15.
- Originally-filed specification, page 5, Eq. 1 describes the intensity distribution in one exemplary embodiment.

Further, in one exemplary embodiment, the intensity distribution is characterized mathematically by Eq. 1. In this expression, the intensity,  $I$ , is represented as a function of a radial coordinate,  $r$ , and depth coordinate,  $z$ , and shows no explicit dependence on  $z$ . In this case, the intensity distribution is constant over a predetermined distance,  $z_D$ , given by Eq. 2b. A preferred minimum predetermined distance is provided on page 6, line 23 as approximately 50  $\mu\text{m}$ .

Thus, Applicants respectfully assert that the originally-filed specification and claims of the present application clearly provide an appropriate and detailed written description for the phrase “along a particular direction, the intensity distribution is approximately constant for at least a predetermined distance,” as recited in independent claims 48, 70 and 101, and “along a particular direction, widths of at least two sections of the intensity distribution are approximately the same,” as recited in independent claims 62 and 84.

Concerning amended claims 58, 66, 80 and 94, the Examiner believes that the originally-filed specification does not contain the disclosure for the phrase **“the intensity distribution having a transverse resolution of a full width at half maximum is less than 10  $\mu\text{m}$ ,”** as recited in these claims. (See latest Office Action, p. 3, second full paragraph). Applicants respectfully disagree, and respectfully submit that the originally-filed drawings and specification provide detailed disclosure and support for such claimed subject matter. The exemplary support is as follows:

- Originally-filed specification, page 6, lines 21-23 provide that in a preferred embodiment, the optical element has a transverse resolution in the range of about 0.5  $\mu\text{m}$  to 10  $\mu\text{m}$ .
- Originally-filed specification, page 5, lines 3-4 provide that the diameter of the line focus determines the transverse resolution.
- Eq. 1 defines an exemplary embodiment of the intensity distribution (including its diameter) for an axicon optical element.

Accordingly, Applicants respectfully assert that the originally-filed specification and claims of the present application clearly provide an appropriate written description for the phrase **“the intensity distribution full width at half maximum is less than 10  $\mu\text{m}$ ,”** as recited in amended claims 58, 66, 80 and 94.

With respect to claims 52, 74 and 88, the Examiner believes that the originally-filed specification does not contain the disclosure for the phrase “**the second arrangement is an annulus**,” as recited in these claims. (See latest Office Action, p. 3, fourth full paragraph). Applicants respectfully disagree, and respectfully submit that the originally-filed drawings and specification provide detailed disclosure and support for such claimed subject matter, e.g., in originally-filed Figure 8 which depicts an annulus appropriate for an axicon lens.

Concerning claims 55, 77 and 91, the Examiner believes that the originally-filed disclosure does not contain the disclosure for the phrase “**the intensity distribution is a Bessel beam**,” as recited in these claims. (See latest Office Action, p. 4, first full paragraph). Applicants respectfully disagree, and respectfully submit that the originally-filed drawings and specification provide detailed disclosure and support for such claimed subject matter. The exemplary support is as follows:

- Eq. 1 provides an exemplary mathematical description of the axial intensity distribution created by an axicon lens in the form of a Bessel function,  $J_0$ .
- Originally-filed specification, page 5, lines 22-24 provides a reference to prior art that describes the intensity distribution created by an axicon lens as being a Bessel beam.

Accordingly, Applicants respectfully assert that the originally-filed specification and claims of the present application appropriate written description for the phrase “**the intensity distribution is a Bessel beam**,” as recited in claims 55, 77 and 91.

For claims 60, 67, 82 and 96, the Examiner believes that the originally-filed disclosure does not contain the disclosure for the phrase “**at least a portion of the intensity distribution has a non-Gaussian distribution**,” as recited in these claims. (See latest Office Action, p. 4, second full paragraph). Applicants respectfully disagree, and

respectfully submit that the originally-filed drawings and specification provide detailed disclosure and support for such claimed subject matter. For example Eq. 1 provides an exemplary mathematical description of the intensity distribution created by an axicon lens. This intensity distribution is a Bessel function and is not a Gaussian function.

Accordingly, Applicants respectfully assert that the originally-filed specification and claims of the present application clearly provide an appropriate written description for the phrase "at least a portion of the intensity distribution has a non-Gaussian distribution," a recited in claims 60, 67, 82 and 96.

Therefore, for at least the reasons presented herein above, Applicants respectfully assert that the 35 U.S.C. § 112, first paragraph rejections of claim 48-97 and 101 are inappropriate, and should be withdrawn.

#### **IV. REJECTION UNDER 35 U.S.C. § 112, ¶2 SHOULD BE WITHDRAWN**

Claims 58, 66, 80, 94, 98, 99 and 102-105 stand rejected under 35 U.S.C. § 112, second paragraph as being allegedly indefinite. As the Examiner shall ascertain, claims 58, 66, 80, 94, 98, 99 and 102 have been amended above to remove minor informalities therefrom, but not for any reasons relating to patentability thereof. Accordingly, as the Examiner's comments regarding claims 58, 66, 80, 94, 98, 99 and 102-105 have now been addressed via the amendments to the claims referenced above, the rejection of these claims under 35 U.S.C. § 112, second paragraph is now moot, and should therefore be withdrawn.

**V. REJECTIONS UNDER 35 U.S.C. §§ 102(b) AND 103(a) SHOULD BE WITHDRAWN**

Claims 48, 49, 52, 56, 57, 62, 63, 65, 69-71, 74, 78, 79, 84, 85, 88, 92 and 93 stand rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 6,091,496 issued to Hill (the “Hill Patent”). Claims 100-102 and 107 stand rejected under 35 U.S.C. §102(b) as being anticipated by International Publication No. WO 99/44089 (the “089 Publication”). Claims 98, 99 and 106 stand rejected under 35 U.S.C. §102(b), as being anticipated by Erdelyi et al., J. Vac Science Technology B 1997 (the “Erdelyi Publication”). Claims 54, 58, 59, 66, 76, 80, 81, 90, 94 and 95 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Hill Patent. Claims 61, 83 and 97 stand rejected under 35 U.S.C. §103(a), as being allegedly unpatentable over the Hill Patent in view of U.S. Patent No. 5,465,147 issued to Swanson (the “Swanson Patent”). Claim 64 stands rejected under 35 U.S.C. §103(a) as being allegedly anticipated over the Hill Patent in view of the Erdelyi Publication. Claims 103-105 stands rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over the ‘089 Publication, in view of U.S. Patent No. 5,892,583 issued to Li (the “Li Patent”).

It is respectfully asserted that the Hill Patent, taken alone or in combination with the Swanson Patent or the Erdelyi Publication, fail to teach, suggest or disclose the subject matter recited in amended independent claims 48, 62, 70 and 84 of the above-referenced application, and the claims which depend therefrom. Further, Applicants respectfully submit that the Erdelyi Publication fails to disclose the subject matter recited in amended independent claim 98 and 106, and claim 99 which depends from independent claim 98. In addition, it is respectfully asserted that the ‘089 Publication, taken alone or in combination with the Li Patent, fail to teach, suggest or disclose the subject matter recited

in amended independent claims 100 and 107, and claims 101-105 which depend from independent claim 100.

In order for a claim to be rejected as anticipated under 35 U.S.C. § 102, each and every element as set forth in the claim must be found, either expressly or inherently described, in a single prior art reference. Manual of Patent Examining Procedures, §2131; *also see Lindeman Maschinenfabrik v. Am Hoist and Derrick*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

In order for a claim to be rejected for obviousness under 35 U.S.C. § 103, not only must the prior art teach or suggest each element of the claim, the prior art must also suggest combining the elements in the manner contemplated by the claim. See *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir.), *cert. denied* 111 S.Ct. 296 (1990); *see In re Bond*, 910 F.2d 831, 834 (Fed. Cir. 1990). "It is improper to use the inventor's disclosure as a road map for selecting and combining prior art disclosures." See *Grain Processing Corp. v. American Maize-Products Corp.*, 840 F.2d 902, 907 (Fed. Cir. 1988). "[T]he reference must be viewed without the benefit of hindsight afforded to the disclosure." *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. See *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

The Hill Patent relates to optical and acoustical imaging, including utilizing such images to perform optical data storage and retrieval, and precision measurements on biological samples, wafers, integrated circuits, optical disks, and other samples. (See Hill Patent, col. 1, Ins. 37-40). The Hill Patent provides a first probe lens having an axial or

longitudinal chromatic aberration which is replaced with a probe lens having a lateral chromatic aberration. The probe lens with lateral chromatic aberration generates a line image in the object material that is aligned proximally perpendicular to the optical axis of the respective probe lens and image points of the line image are acquired substantially simultaneously. (See *id.*, col. 25, Ins. 1-15).

Further, with respect to Fig. 1d thereof, the Hill Patent provides that the light beam P22C passes through lens 46 as light beam P22D including light beams P22D-1,-2,-3,-4 which are focused to form a line image centered at image point 28 in image plane 27 in object material 112. The axis of the line image is substantially parallel to the optical axis 3 of imaging subsystem 82. The length of the line image is determined by a combination of factors such as the depth of focus and chromatic aberration of probe lens 46 and the optical bandwidth of the source 10. Optical axis of lens 46 is aligned with optical axis 3 of subsystem 82. (See *id.*, col. 37, In. 67 to col. 38, In. 9).

The '089 Publication relates to systems, method and apparatus for confocal microscopy for the examination or imaging of sections of a specimen of biological tissue, and particularly to such systems using multi-spectral illumination and processing of multi-spectral light. (See '089 Publication, p. 1, Ins. 10-13). In the probe 8 of the microscope of the '089 Publication, and as shown in Fig. 1 thereof, the source spectrum provided via an optical fiber 9 is dispersed by a grating 12 and focused by an objective lens 14 onto the sample 16. A lens 9a is disposed between the optical fiber 9 and the grating 12 to collimate the light from the optical fiber. As shown in Fig. 1, the spot for each wavelength is focused at a separate position, x, on the sample. The reflectance as a function of transverse location is determined by measuring the reflected confocal spectrum from the sample 16

returned from probe 8. (See *id.*, p. 3, Ins. 15-18). For an input source with a center wavelength of 800 nm, a bandwidth of 25 nm, an input spot diameter of 5 mm, a diffraction grating of 1800 lines/mm and a diffraction order of 1, n = 281 points may be resolved by the spectrally encoded confocal system. (See *id.*, p. 4, Ins. 5-7).

The Erdelyi Publication relates to an arrangement and method, based on a Fabry-Perot interferometer, for the generation of nondiffracting Bessel beams for potential applications in microlithography, such as fabrication of small isolated patterns. (See Erdelyi Publication, Abstract). Fig. 1 of the Erdelyi Publication provides an experimental setup in which a CCD transmits light through two lenses, and then through an objective. The aperture of the objective lens transmits the first Fabry-Perot ring, and blocks all other rings. (See *id.*, p. 288, right column, lines 1-4; and Fig. 1).

#### A. Claims 48-97

Claims 48, 49, 52, 56, 57, 62, 63, 65, 69-71, 74, 78, 79, 84, 85, 88, 92 and 93 stand rejected under 35 U.S.C. §102(b) as being allegedly anticipated by the Hill Patent. Claims 54, 58, 59, 66, 76, 80, 81, 90, 94 and 95 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Hill Patent. Claims 61, 83 and 97 stand rejected under 35 U.S.C. §103(a), as being allegedly unpatentable over the Hill Patent in view of the Swanson Patent. Claim 64 stands rejected under 35 U.S.C. §103(a) as being allegedly anticipated over the Hill Patent in view of the Erdelyi Publication.

Applicants' invention, as recited in amended independent claim 48, relates to an apparatus for imaging at least a portion of a sample which comprises, *inter alia*:

a first interferometric arrangement providing an electro-magnetic radiation ... ,

wherein, along a particular direction, the intensity distribution is approximately constant for at least a predetermined distance, and wherein a **wavelength of the electro-magnetic radiation remains approximately the same for at least the predetermined distance at which the intensity distribution is approximately constant**.

Amended independent claim 70 relates to a method which recites similar subject matter.

Applicants' invention, as recited in amended independent claim 62, relates to an apparatus for imaging at least a portion of a sample which comprises, *inter alia*:

a first interferometric arrangement providing an electro-magnetic radiation ... ,

wherein, along a particular direction, widths of at least two sections of the intensity distribution are approximately the same, and wherein a **wavelength of the electro-magnetic radiation remains approximately the same for at least the at least two sections of the intensity distribution**.

Amended independent claim 84 relates to a method which recites similar subject matter.

Applicants respectfully assert that the Hill Patent in no way teaches or suggests, much less discloses that a **wavelength of an electro-magnetic radiation remains approximately the same for at least a predetermined distance at which an intensity distribution is approximately constant**, as explicitly recited in amended independent claims 48 and 70 of the above-identified application. In addition, it is respectfully submitted that the Hill Patent in no way teaches or suggests, much less discloses that a **wavelength of an electro-magnetic radiation remains approximately the same for at least at least two sections of an intensity distribution**, as explicitly recited in amended independent claims 62 and 84 of the above-identified application.

In particular, the Hill Patent describes that the light beam P22C passes through lens 46 as light beam P22D including light beams P22D-1,-2,-3,-4 which are focused to form a line image centered at image point 28 in image plane 27 in object

material 112. (See Hill Patent, col. 37, ln. 67 to col. 38, ln. 9; and Fig. 1d) Thus, these light beams of the Hill Patent form different wavelengths along any distance at which the intensity distribution remains somewhat constant, as well as for any two sections of intensity distribution of these beams. (See *id.*, Fig. 1d). However, the Hill Patent does not teach, suggest or disclose that **a wavelength of any its beams remains approximately the same for at least the predetermined distance at which the intensity distribution is approximately constant**, as provided in amended independent claims 48 and 70, or that **a wavelength of any of the beams remains approximately the same for at least at least two sections of an intensity distribution**, as provided in amended independent claims 62 and 84.

The Swanson Patent and the Erdelyi Publication do not cure at least these deficiencies of the Hill Patent, and the Examiner does not contend that they do.

Accordingly, for at least the reasons presented herein above, Applicants respectfully submit that the Hill Patent, taken alone or in combination with the Swanson Patent and the Erdelyi Publication, fails to teach, suggest or disclose the subject matter recited in independent claims 48, 62, 70 and 84, and the claims which depend therefrom pursuant to 35 U.S.C. §§ 102(b) and 103(a).

#### B. Claims 98, 99 and 106

Claims 98, 99 and 106 stand rejected under 35 U.S.C. §102(b), as being anticipated by the Erdelyi Publication.

Applicants' invention, as recited in amended independent claim 98, relates to an apparatus for imaging at least a portion of a sample which comprises, *inter alia*:

a first interferometric arrangement providing an electro-magnetic radiation; and

**a second arrangement provided within the first interferometric arrangement and configured to receive the electro-magnetic radiation, and configured to generate a resultant electro-magnetic intensity distribution . . .**

Amended independent claim 106 relates to a method which recites similar subject matter.

Applicants respectfully assert that the Erdelyi Publication in no way discloses that **an arrangement configured to receive an electro-magnetic radiation and generate a resultant electro-magnetic intensity distribution is provided within another interferometric arrangement**, as explicitly recited in amended independent claims 98 and 106 of the above-identified application.

In particular, the Erdelyi Publication describes a Fabry-Perot interferometer and a separate experimental setup a CCD transmits light thought two lenses, and then through an objective. The aperture of the objective lens transmits the first Fabry-Perot ring, and blocks all other rings. (See Erdelyi Publication, Abstract and p. 288, right column, lines 1-4; and Fig. 1). Thus, the Fabry-Perot interferometer and the experimental setup of the Erdelyi Publication are *separate and apart from one another*. In contrast, amended independent claims 98 and 106 of the above-identified application recite that **an arrangement (configured to receive an electro-magnetic radiation and generate a resultant electro-magnetic intensity distribution) is provided within another interferometric arrangement**.

Accordingly, for at least the reasons presented herein above, Applicants respectfully submit that the Hill Patent, taken alone or in combination with the Swanson Patent and the Erdelyi Publication, fails to disclose the subject matter recited in

independent claims 98 and 106, and claim 99 which depends from independent claim 98 pursuant to 35 U.S.C. § 102(b).

### C. Claims 100-105 and 107

Claims 100-102 and 107 stand rejected under 35 U.S.C. §102(b) as being anticipated by the '089 Publication.

Applicants' invention, as recited in amended independent claim 100, relates to an apparatus for imaging at least a portion of a sample which comprises, *inter alia*:

a first interferometric arrangement providing an electro-magnetic radiation ... ,

wherein, along a particular direction, a plurality of focal points of the intensity distribution are generated, and

**wherein a wavelength of the electro-magnetic radiation remains approximately the same along the particular direction for the focal points.**

Amended independent claim 107 relates to a method which recites similar subject matter.

Applicants respectfully assert that the '089 Publication in no way teaches or suggests, much less discloses that **a wavelength of the electro-magnetic radiation remains approximately the same along a particular direction for focal points**, as explicitly recited in amended independent claims 98 and 106 of the above-identified application.

In particular, the '089 Publication describes the reflectance as a function of transverse location is determined by measuring the reflected confocal spectrum from the sample 16 returned from probe 8. For an input source with a center wavelength of 800 nm, a bandwidth of 25 nm, an input spot diameter of 5 mm, a diffraction grating of 1800

lines/mm and a diffraction order of 1,  $n = 281$  points may be resolved by the spectrally encoded confocal system. (See '089 Publication, p. 3, ln. 15 to p. 4, ln. 7). Thus, the confocal spectrum of the '089 Publication provide different wavelengths along a particular direction for focal points remains constant. (See *id.*, Fig. 1). In contrast, amended independent claims 100 and 107 of the above-identified application recite that **a wavelength of the electro-magnetic radiation remains approximately the same along a particular direction for focal points.**

The Li Patent does not cure at least these deficiencies of the '089 Publication, and the Examiner does not contend that it does.

Accordingly, for at least the reasons presented herein above, Applicants respectfully submit that the '089 Publication, taken alone or in combination with the Li Patent, fails to disclose the subject matter recited in independent claims 100 and 107, and claims 101-105 which depend from independent claim 100 pursuant to 35 U.S.C. §§ 102(b) and 103(a).

#### D. Summary

Therefore, for at least the reasons presented herein above, Applicants respectfully request the Examiner to withdraw the current 35 U.S.C. §§ 102(b) and 103(a) rejections.

**VI. CONCLUSION**

In light of the foregoing, Applicants respectfully submit that pending claims 48-108 are in condition for allowance. Prompt consideration, reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,



Dated: April 11, 2007

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4837-2019-9425\2